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HK Electric Enhances Power System Resilience to Withstand Extreme Weather Events by 2100

In the face of increasing frequency of extreme weather events exacerbated by climate change, HK Electric has been enhancing its power network and systems to maintain a stable and reliable power supply to its customers under all weather conditions.

Improvements in five major areas include strengthening Lamma Power Station (LPS) against storms and overtopping waves, and implementing anti-flooding measures in new substations. Once these initiatives are fully in place, HK Electric will be well-prepared to cope with the severe challenges posed by adverse and extreme weather events until the end of the 21st century.

The design standards of HK Electric's power supply facilities have been enhanced by making reference to the reports of the Intergovernmental Panel on Climate Change as well as the city's hydrological and astronomical data and forecasts. Contingency measures have been implemented to ensure the normal operation of LPS and substations, protecting them from severe flooding and other extreme weather events.

HK Electric primarily uses underground cables for power transmission and distribution to protect its network against lightning strikes and extreme weather. Thanks to this resilience, the Company's power supply has remained generally stable even during the attacks by the super typhoon Mangkhut years ago where only a few coastal substations in the Eastern District were flooded.

HK Electric General Manager (Transmission and Distribution) Mr. Tony Yeung noted that the Company has been adopting anti-flooding measures since the 1990s to protect facilities in flood-prone areas like Sheung Wan. But the increasing intensity of tropical storms resulting from climate change could pose serious threats to the power supply network, in particular the coastal power installations in the Eastern District which have previously been affected by flooding.

Mr. Yeung said, "We have reviewed our strategies and strengthened emergency response measures. These include enhancing the flood-proof and wind-proof capabilities of critical facilities, improving surveillance systems in substations,

optimising rapid response measures during emergencies, and ensuring sufficient and easily accessible emergency equipment."

He further stated that based on past records, low-lying regions within 100 metres of the coast are more vulnerable to flooding during adverse weather, so the Company has installed and upgraded anti-flooding equipment in over 280 of them in the past decade. These include:

- Installing automatic water pumps;
- Erecting flood walls, gates or barriers at substation entrances and ventilation inlets;
- Retrofitting support stands for major power installations to enhance flood resilience;
- Installing CCTV cameras and multi-stage flood alarm systems; and
- Implementing remote surveillance systems for real-time monitoring of substation conditions."

Recognising that super typhoon Mangkhut had brought water levels to a record high of +5.45 metres Principal Datum (PD) at areas with HK Electric's facilities, and referencing a government report on high-risk flooding areas, HK Electric has conducted a comprehensive review of substations located in these areas as well as LPS.

Following the review, the Company is constructing or extending substation flood walls to +6.0 metres PD whenever practicable. Work is expected to complete by early 2026 for facilities located in the high-risk flooding areas and within 100 metres of the coast. For those in urban centres away from the coast, necessary enhancements have been made after an assessment of their flood resilience.

Meanwhile, new design guidelines have been established for primary substations built after June 2022 to ensure they are capable of withstanding flood levels of +7.0 metres PD. Customer-built distribution substations are also required to follow the new standard unless special exemptions apply. With this, all new substations will be able to withstand severe floods arising from extreme weather events by the end of the century, ensuring the stability of the power network.

As for power generation facilities, HK Electric General Manager (Generation) Mr. Chow Fo-shing pointed out that the recently-commissioned gas-fired generating unit L12 and unit L13 currently under construction have their foundations built to a +7.0 metres PD specification, significantly reducing the risk of flooding. He noted the challenges posed by extreme weather events to the Company's mission of providing a stable and reliable power supply to Hong Kong.

Other measures implemented include breakwaters, and flood walls of about two metres high at key locations in LPS to mitigate the impact of storm surges and overtopping waves. This year, demountable floodgates will also be set up in strategic coastal areas, and protective devices for critical power generating facilities have been relocated or upgraded to ensure continuous operation during extreme weather events.

“In addition to these measures and the routine maintenance of drainage channels, we have also refined our contingency plans and arrangements for adverse and extreme weather events,” Mr. Chow said. “This includes arranging additional manpower at LPS to maintain normal operations and handle emergency repairs, and conducting regular drills to enhance the preparedness and capabilities of LPS personnel in dealing with floods.”

Mr. Chow believes these measures will enable LPS to cope effectively with flooding and other challenges arising from extreme weather events.

HK Electric has been maintaining a world-class power supply reliability rating of over 99.999% since 1997. Looking ahead, the Company remains committed to providing stable and reliable power supply services to customers on Hong Kong and Lamma islands, contributing to the city’s economic and social development. It fully supports the Government’s carbon reduction goals and aims to achieve net-zero power generation by 2050 to combat global warming.

Photo Captions:

HK Electric General Manager (Generation) Mr. Chow Fo-shing (left) and General Manager (Transmission and Distribution) Mr. Tony Yeung (right) introduce the measures to enhance the Company’s power system resilience against extreme weather.

The floor of the gas-fired generating unit L12 has its foundation built to a +7.0 metres PD specification, significantly reducing the risk of flooding.

Flood walls of about two metres high have been erected at key locations in Lamma Power Station.

Demountable floodgates are being used to protect critical power generating facilities and auxiliary installations.

The floor level of all new substations is raised to enhance flood protection.

Flood walls are erected at existing distribution substations.

Automatic water pumps and flood alarm systems are installed at existing distribution substations.

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